

# **PEDESTRIAN SAFETY AT HIGH SCHOOLS:**

## **Issues Regarding Crosswalks, Signals, and Multi-Lane Facilities**

### ***A Case Study at Cary High School***



R.J. (Jeff) Jaeger, PE  
September 2004

Traffic Safety Systems Management Unit  
Traffic Engineering and Safety Systems Branch  
North Carolina Department of Transportation

# FACILITY ISSUES

- Cross-sections (4+ lanes including auxiliary lanes, sidewalks)
- Speed limit (40+ MPH)
- Free flow speed (over 35 MPH)
- Ordinances (type 17, posted, consistent with movements)
- AADT
- Signing (presence, MUTCD accepted)



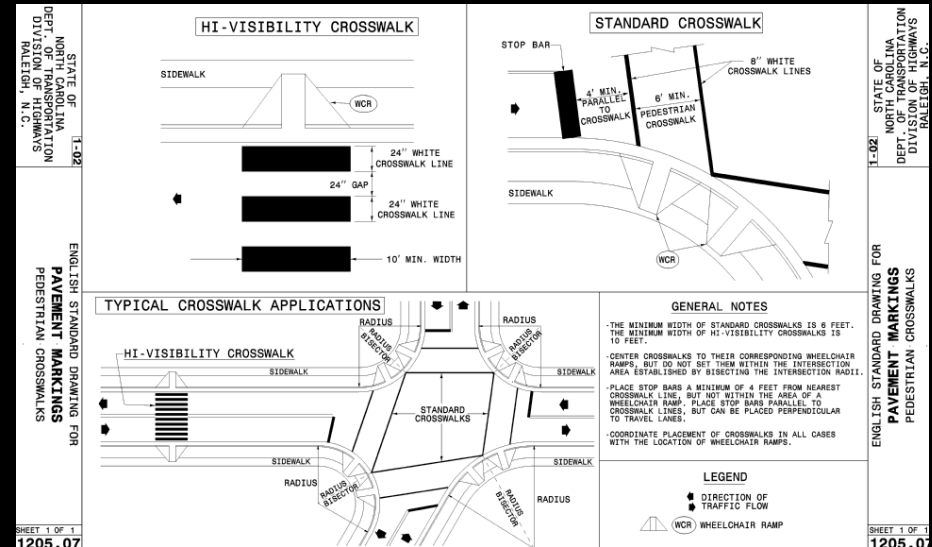
# SIGNAL ISSUES

- Pedestrian signal heads
- Actuation
- WALK and clearance times



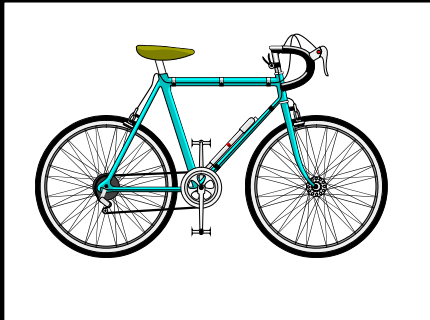
# CROSSWALK ISSUES

- Marked (presence, type, condition, length)
- Placement (skewed intersections, stop bars, pedestrian movements, etc.)
- Illumination (presence, location, pedestrian level)
- Visibility impediments (signal cabinets, utilities, vegetation, parking, loading zones, transit stops, etc.)
- Islands or medians
- Pedestrian channelization
- Crossing guard (presence)



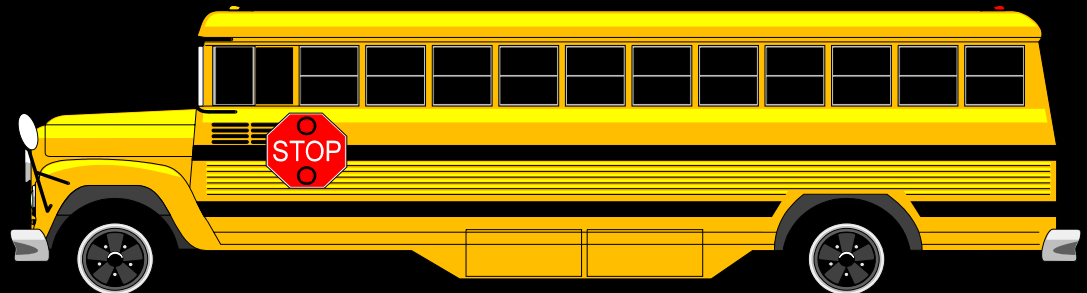
# MISCELLANEOUS ISSUES

- Pedestrian and bicycle counts
- Crash history (pedestrians, bicyclists, and motor vehicles)



# SCHOOL ISSUES

- Student parking facilities (location, quantity)
- Internal rotation (accessibility and storage)
- Additional discharge/loading locations (through lanes, non-school parking lots, etc.)
- Instructional calendar (traditional, year-round, etc.)
- Hours of operation (including before and after school activities)
- Type of student activities (before and after school)



## Additional School Issues (open campus only)

- Lunch hours (total time period)
- Number of lunch periods
- Current student population
- Cafeteria capacity
- Nearby student attractions (fast food, malls, convenience stores, etc.)



## ***A Case Study:***

# **Cary High School Cary, NC**





- Built in 1958
- Designed to serve grades 9 through 12 on a traditional schedule
- Designed to hold 1,579 students
- Currently holds 2,209 students and has a staff of 165 teachers, administrators, and others
- Currently operates between 7:25 a.m. and 2:18 p.m. with 3 lunches (10:30 a.m. - 12:45 p.m.)
- 336 on-campus parking spaces available to students (\$120/school year)



# REASONS FOR EVALUATION: RECENT FREQUENCY OF PEDESTRIAN CRASHES

Friday, October 3, 2003 (4:59 p.m.)

14-year-old female student

Type B injury

Crossing Walnut Street at a midblock location in front of CHS

Monday, October 20, 2003 (6:59 a.m.)

18-year-old female student

Type B injury

Crossing Maynard Road at the intersection with Walnut Street (to CHS)

Wednesday, November 12, 2003 (3:13 p.m.)

14-year-old male student

Type C injury

Crossing Walnut Street at a midblock location in front of CHS

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# Police Continue Search For Green Truck In Cary Hit-And-Run

## *Teenage Girl In Serious Condition*

POSTED: 7:43 a.m. EDT October 20, 2003

UPDATED: 7:23 a.m. EDT October 21, 2003

**CARY, N.C.** -- Cary police are looking for a hit-and-run driver who struck a Cary High School student Monday morning.



**Police said a green Ford pickup truck struck a female student at Walnut and Maynard streets at 6:59 a.m. Monday.**

Eighteen year-old Kristina Grahm was recovering from her injuries while investigators hunted for the man who ran her down. The Cary High School senior was listed in serious condition at WakeMed with injuries that include a broken leg.

The morning rush hour took a violent turn when a pickup truck hit Grahm and did not even stop. The incident happened around 7 a.m. at Walnut Street and Southeast Maynard.

On campus Monday afternoon, there was concern for the victim and anger at the driver.

"I think it's pretty messed up," student Jessica Pesce said. "She was just crossing the street. If you hit somebody, you should stop to see if they are OK."



Students dodge traffic every day on busy streets near the school. Many park at a nearby shopping center and cross Maynard to get to the campus. Investigators think that is what Grahm was doing when she was hit.

Police said the driver was turning right from Walnut onto Maynard when he hit Grahm right in front of the school.

"She was in the crosswalk close to the center," said Capt. Dave Wulff, of the Cary Police Department. "He struck her



# Authorities Identify Vehicle Type Involved In Cary Hit And Run

## 1999-03 Green F-150 Pickup With Broken Grill Sought

POSTED: 5:53 p.m. EDT October 22, 2003

UPDATED: 9:53 a.m. EDT October 23, 2003

**CARY, N.C.** -- Cary police said they have zeroed in on the make and model of the pickup truck involved in a hit-and-run accident that injured a high school student Monday morning.



**Police said evidence left at the scene indicates the green Ford F-150 pick-up truck is between a 1999 and 2003 year model with a silver honeycomb grill.**

Investigators said [a newer-model green Ford F-150 pickup](#) struck 18-year-old Kristina Grahm as she was crossing the intersection of Walnut and Maynard streets near Cary High School.

Grahm remains hospitalized in fair condition.

Evidence left at the scene indicates the green Ford F-150 pick-up truck is between a 1999 and 2003 year model with a silver honeycomb grill. The truck should have at least the upper right section of the grill broken out as well as other minor to moderate front-end damage.



**Kristina Grahm, 18, was struck by a vehicle as she was crossing the intersection of Walnut and Maynard streets near Cary High School Monday morning.**

"He definitely knew he hit someone. After he struck the young lady, he went up onto the curb. Witnesses say he stopped for a second and left," said Sgt. Joe Clifton of the Cary Police Department.

The driver was described as an older white man.

Cary police continue to

# Police Emphasize School-Zone Safety Following Cary Hit-And-Run

*Authorities Search For Suspect, Truck As Students Seek Safe Way To Cross Street*

POSTED: 5:26 p.m. EDT October 23, 2003

UPDATED: 12:56 a.m. EDT October 24, 2003

**RALEIGH, N.C.** -- A Cary High School student is still recovering from a hit-and-run accident that occurred near campus Monday. The accident raised concerns not only about crosswalk confusion, but school-zone safety.



**Crosswalks can prove dangerous for students on their way to school.**

The accident has police trying to crack down on safety at many schools.

Dodging traffic is part of the daily routine for students at Broughton High School. Drivers are supposed to slow down and give students the right of way at crosswalks. School-zone signs are posted everywhere as reminders. But students say too many drivers ignore them.

"I think it's ridiculous," student Caroline Griffin said. "They drive like they're crazy. It's not safe for people who cross the street at school."

Said Broughton student Katie Banner: "I think it's unsafe. Last year, somebody was hit."

Cary High School senior Kristina Grahn, 18, was hit by a car Monday morning as she crossed the street to campus. Police said a driver made an illegal right turn in the school zone before hitting the girl.

The authorities are still looking for the truck and driver.

Police said the Cary accident proves that people can not be too careful with cars and kids.

**VIDEO**





# Cary Student Injured In Hit-And-Run Released From Hospital

POSTED: 9:15 a.m. EST October 28, 2003

UPDATED: 9:27 a.m. EST October 28, 2003

**CARY, N.C.** -- A Cary High School student injured in a hit-and-run accident has been released from the hospital.

Kristina Grahn, 18, is home after spending a week at WakeMed.

Police said Grahn was struck by a pickup as she was crossing the intersection of Walnut and Maynard streets near the high school on Oct. 20.

Police have not caught the driver involved.

Evidence left at the scene indicates the vehicle was a green Ford F-150 pickup truck -- between a 1999 and 2003 year model with a silver honeycomb grill. The truck should have at least the upper right section of the grill broken out as well as other minor to moderate front-end damage.

Anyone with information is asked to call Crimestoppers at (919) 226-CRIM(E), pressing option 3 for Cary, or Cary police at (919) 469-4016.

## Previous Stories:

- October 23, 2003: [Police Emphasize School-Zone Safety Following Cary Hit-And-Run](#)
- October 23, 2003: [Authorities Identify Vehicle Type Involved In Cary Hit-And-Run](#)
- October 21, 2003: [Police Continue Search For Green Truck In Cary Hit-And-Run](#)

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# COMMITTEE COMPOSITION

- School Principal
- Municipal Engineer
- Local law enforcement
- NCDOT Division Traffic Engineer
- NCDOT Area Engineer
- NCDOT Signals and Geometrics Engineer
- NCDOT Municipal and School Transportation Assistance Engineer
- NCDOT Traffic Safety Engineer



# AERIAL VIEW OF CARY HIGH SCHOOL

## Walnut Street (SR 1313)

Cary Village Square



Cary  
Towne  
Center

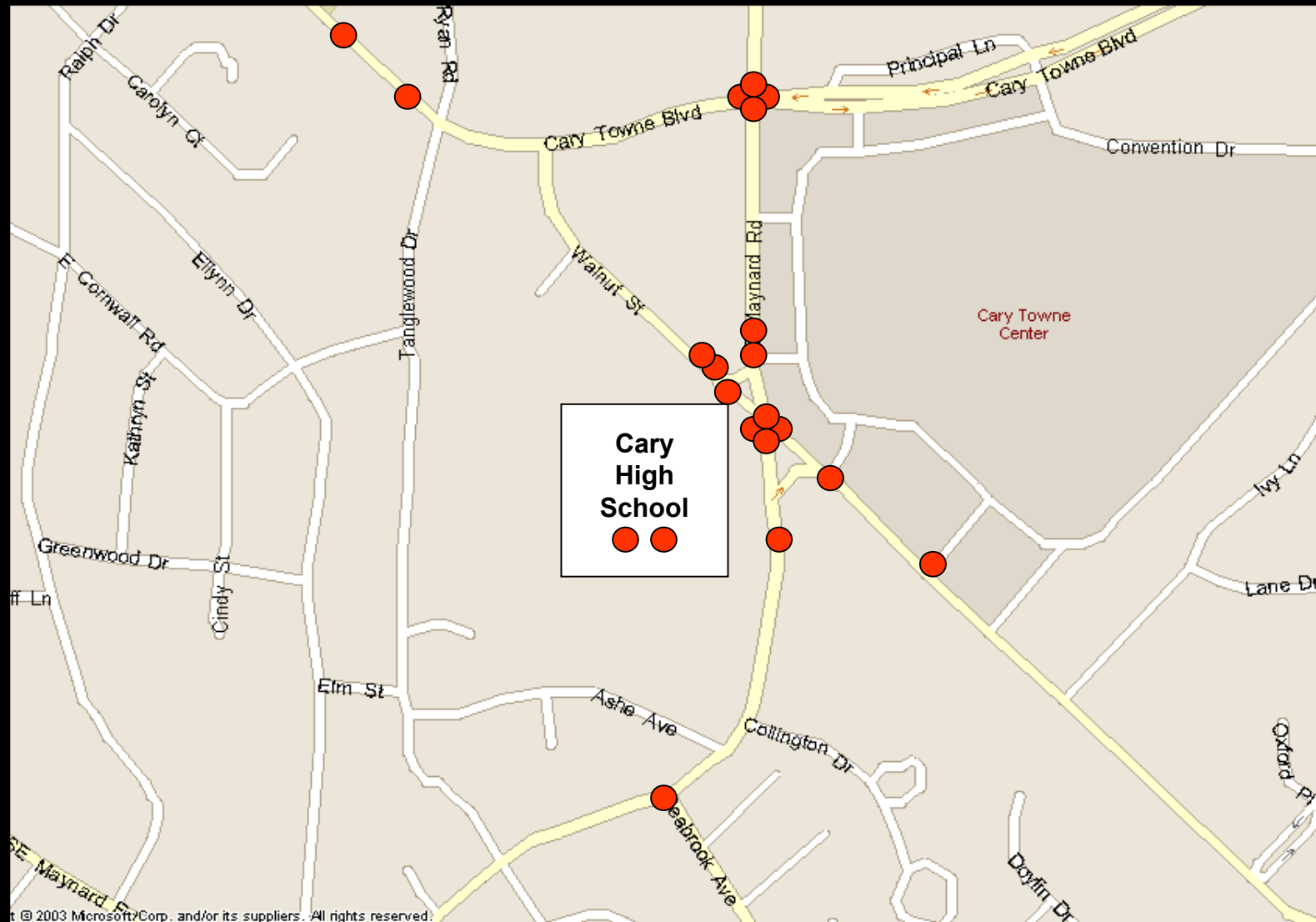
Cary  
Commons  
Shopping  
Center

- Urban minor arterial
- 5 lane undivided curb and gutter
- 35 MPH speed limit
- No access control
- 85th percentile speed of 37 MPH (speed range of 17-44 MPH)
- AADT of 28,000 VPD

## Maynard Road (SR 1415)

- Urban minor arterial
- 5 lane undivided curb and gutter
- 35 MPH speed limit
- No access control
- 85th percentile speeds of 29 MPH (speed range of 15-34 MPH)
- AADT of 18,700 VPD
- School zone speed limit of 25 MPH (typical 30 minutes before and after)

# BICYCLE AND PEDESTRIAN CRASHES IN THE VICINITY OF CARY HIGH SCHOOL (MAY 1, 1993 - NOVEMBER 12, 2003)



# PEDESTRIAN COUNTS

## Walnut Street (SR 1313)

- 6:00 a.m. - 7:00 p.m.
- 694 pedestrians
- 16% (6:45-7:30)
- 52% (10:30-12:45)
- 22% (2:15-3:45)

## Walnut at Maynard

- 6:00 a.m. - 10:00 p.m.
- 330 pedestrians
- 17% (6:45-7:30)
- 28% (10:30-12:30)
- 35% (2:15-3:30)

## Maynard Road (SR 1415)

- 6:00 a.m. - 7:00 p.m.
- 168 pedestrians
- 24% (7:00-7:30)
- 18% (10:30-1:00)
- 45% (2:15-4:00)





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- **45% (2:15-4:00)**



# OTHER ISSUES

- Parents/ guardians circumvent established rotation and discharge students in nearby parking lots, in through lanes adjacent to or across from school grounds, and even in the center left turn lane
- Darkness may be an issue during Eastern Standard Time (EST)
- 4% of pedestrians leave the school between 6:45 and 7:45 a.m. (unexpected movement)
- School administrators had previously requested, through the PTA, that parents/guardians not do curbside discharging/loading of students or to discharge/load students in the Cary Commons Shopping Center
- A school zone speed limit ordinance for Walnut Street was pending but not yet approved
- At the Walnut Street/Maynard Road intersection, there were large distances between the stop bars on the Walnut Street approaches and the pedestrian crosswalks on the Maynard Road approaches

















ON  
RED





# RECOMMENDATIONS

- Install midblock crosswalk with refuge island
- Revise signing
- Install lighting
- Approve new school zone speed limit ordinances (3-tiered, based on pedestrian movements)
- Install pedestrian barrier/channelization system (fence or bollard/shrub combination)
- Realign intersection crosswalks and install pedestrian countdown signal heads
- Extend school fence
- Close hedgerow gaps at the Cary Commons Shopping Center
- Initiate student-based pedestrian safety awareness
- Monitor and evaluate the location



# DOT Offers Plan To Change Intersection Near Cary High School

## *Student Struck By Car At Intersection*

POSTED: 11:57 a.m. EST December 9, 2003

**CARY, N.C.** -- After a student was struck by a car two months ago, the state Department of Transportation now says it has a plan to make the intersections around Cary High School safer.



**After a student was hit by a car at an intersection near her school in Cary, the state Department of Transportation wants to make some changes.**

In October, Kristina Grahn was struck while she crossed at Walnut Street and Maynard Road.

Safety engineers say a raised median should replace the center turn lane on Walnut. They also say signage should be increased and the speed limit decreased to 25 miles per hour.

Cary traffic engineers say they would be willing to share the \$275,000 cost with the state.

### Previous Stories:

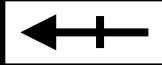
October 24, 2003: [Police Emphasize School-Zone Safety Following Cary Hit-And-Run](#)

- October 23, 2003: [Authorities Identify Vehicle Type Involved In Cary Hit-And-Run](#)
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OnLine Producer: [Karnal Wallace](#)

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# Walnut Street at Maynard Road



**Walnut Street  
(SR 1313)**

**Maynard Road  
(SR 1415)**

Remove wheelchair ramp  
and pedestrian signal

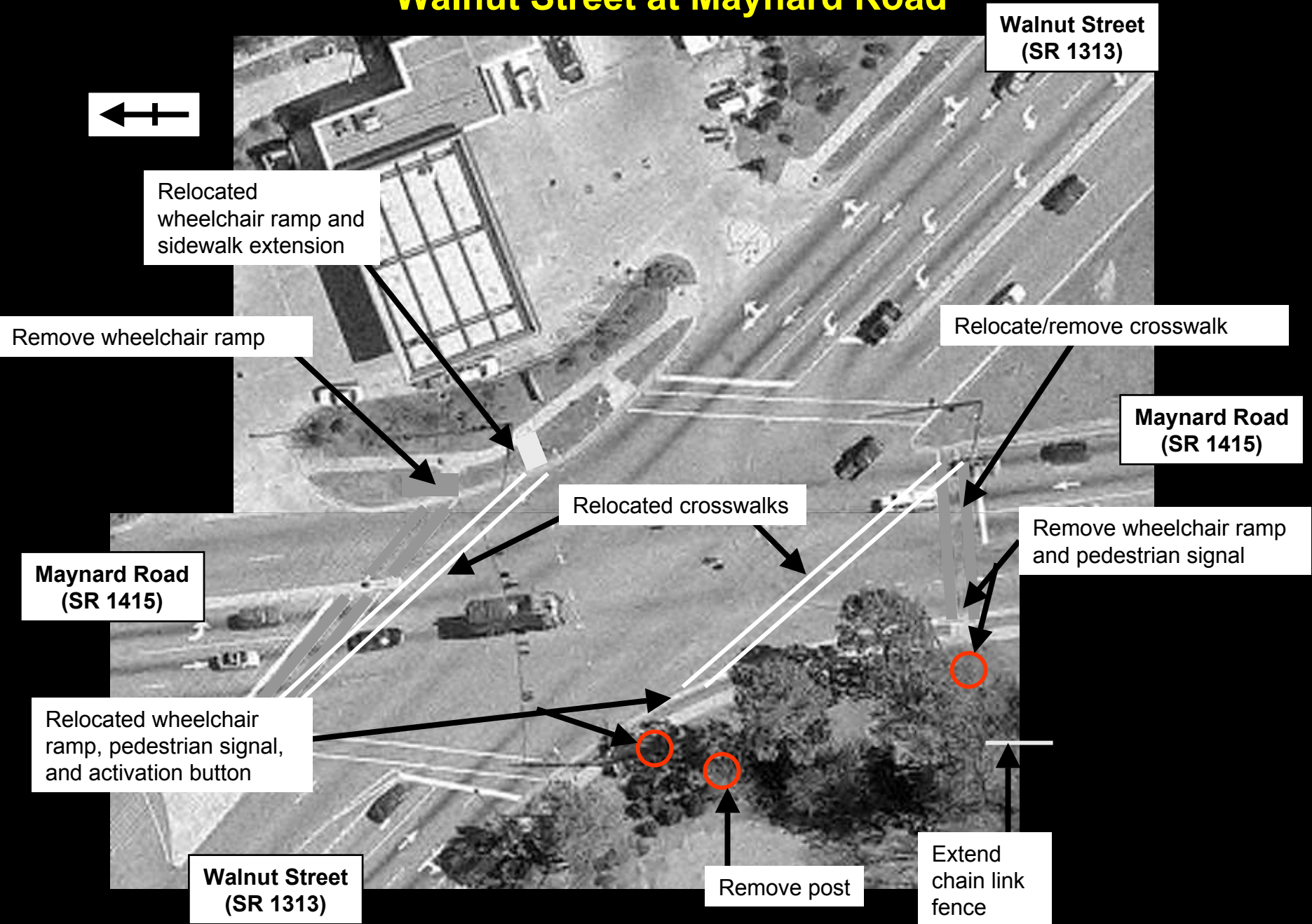


**Maynard Road  
(SR 1415)**

**Walnut Street  
(SR 1313)**



# Walnut Street at Maynard Road







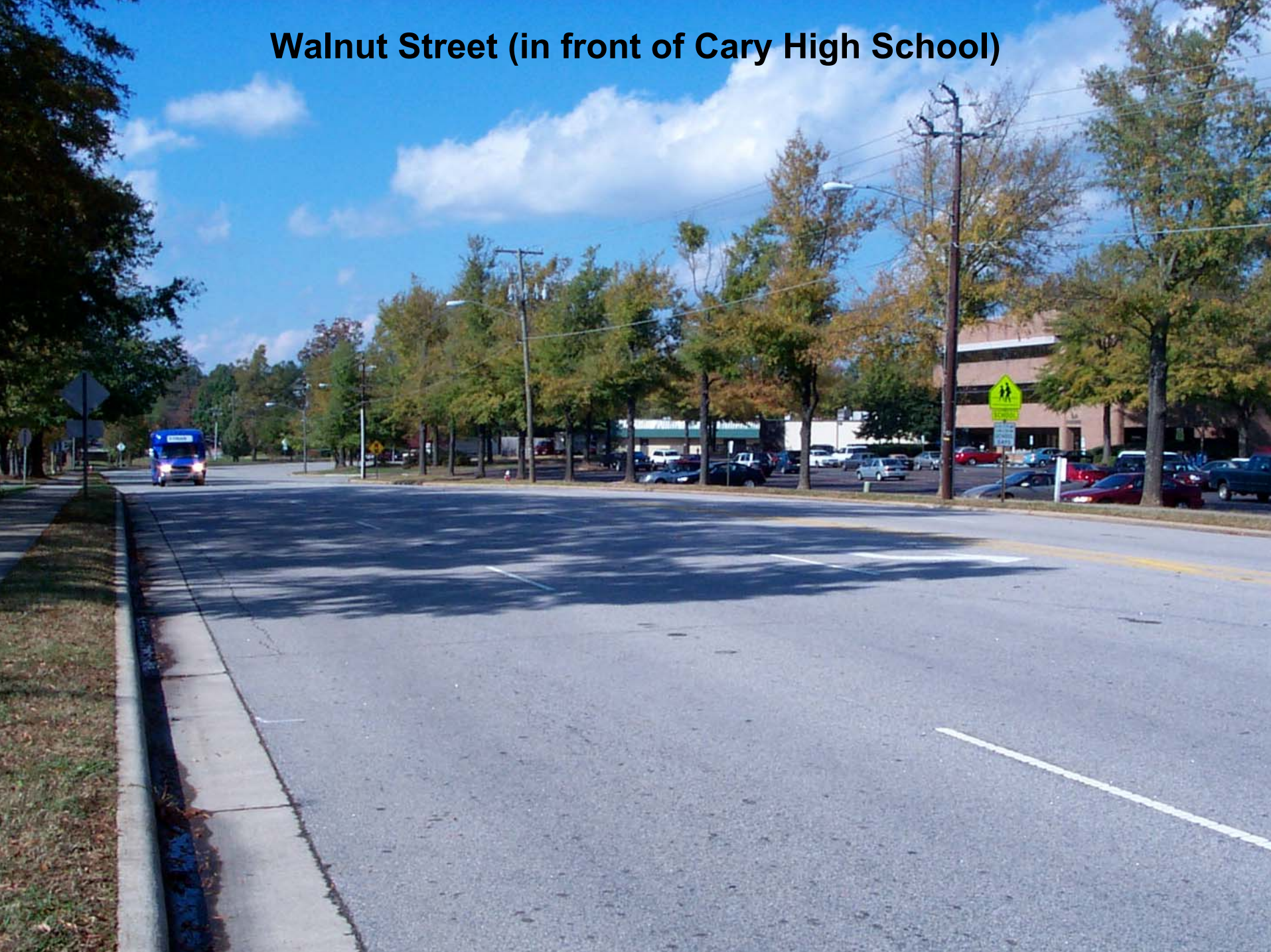






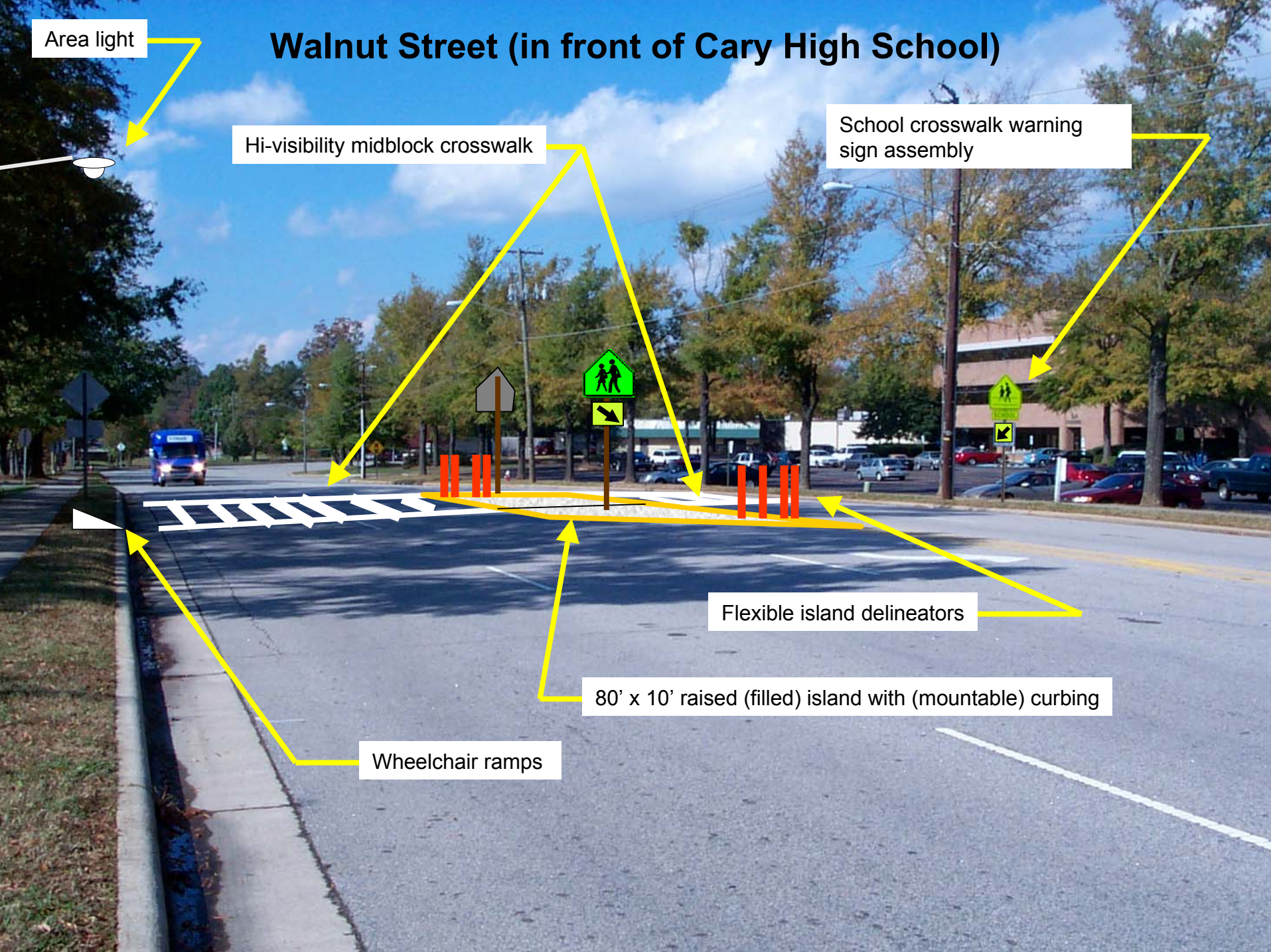


# Walnut Street (in front of Cary High School)





# Walnut Street (in front of Cary High School)



Area light

Hi-visibility midblock crosswalk

School crosswalk warning  
sign assembly

Flexible island delineators

80' x 10' raised (filled) island with (mountable) curbing

Wheelchair ramps





























SCHOOL

SPEED  
LIMIT  
25

6:40 - 7:40 AM  
10:30AM-3:45PM  
SCHOOL  
DAYS

CAB





QUESTIONS?